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Report of the United Nations Scientific Committee on the Effects of Atomic Radiation

General Assembly

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Fifty-third session
Supplement No. 46 (A/53/46)

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Note

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Chapter I

Introduction

1. The forty-seventh session of the United Nations Scientific Committee on the Effects of Atomic Radiation[1] was held at Vienna from 25 to 29 May 1998. At that session the Scientific Committee took note of General Assembly resolution 52/55 of 10 December 1997, entitled "Effects of atomic radiation", and welcomed the endorsement by the Assembly of its future activities and scientific review of the sources and effects of ionizing radiation. The Committee also noted the special request contained in paragraph 9, which reads as follows:

> "*The General Assembly,*
>
> "...
>
> "9. *Invites* the International Atomic Energy Agency and the World Health Organization to consider the functions and role of the Scientific Committee and to submit a recommendation to the General Assembly at its fifty-third session, and, meanwhile, requests the Scientific Committee to submit its report to the International Atomic Energy Agency and the World Health Organization, as well as to the General Assembly, which will consider the report together with the evaluation of the report by the International Atomic Energy Agency and the World Health Organization."

2. The present report informs the General Assembly of the activities of the Committee and presents its views on its specific role and functions as well as its programme and methods of working. The Committee submits annual reports on the progress of its work to the Assembly and, at intervals of several years – the latest reports were published in 1993, 1994 and 1996 comprehensive scientific reports of its findings.[2] Those reports have comprised up to 1,400 pages, with 350 tables, 200 diagrams and 2,000 bibliographical references. They represent definitive scientific assessments, based on the Committee's independent review and evaluation, of the levels of exposures and the effects of radiation.

Chapter II

The functions and role of the United Nations Scientific Committee on the Effects of Atomic Radiation

3. The Committee was established by the General Assembly by its resolution 913 (X) of 3 December 1955 in which the Assembly requested the Committee, *inter alia*,

> "(*a*) To receive and assemble in an appropriate and useful form the following radiological information furnished by States Members of the United Nations or members of the specialized agencies:
>
> "(i) Reports on observed levels of ionizing radiation and radioactivity in the environment;
>
> "(ii) Reports on scientific observations and experiments relevant to the effects of ionizing radiation upon man and his environment already under way or later undertaken by national scientific bodies or by authorities of national Governments;
>
> "...
>
> "(*d*) To review and collate national reports, referred to in subparagraph (*a*) (ii) above, evaluating each report to determine its usefulness for the purposes of the Committee;
>
> "(*e*) To make yearly progress reports and to develop by 1 July 1958, or earlier if the assembled facts warrant, a summary of the reports received on radiation levels and radiation effects on man and his environment together with the evaluations provided for in subparagraph (*d*) above and indications of research projects which might require further study".

The Committee's mandate has been renewed annually by the General Assembly in its resolutions on the subject since 1955 until the present time.

4. At the time the General Assembly initiated the work of the Committee, the principal concern was the hazards of radionuclides in the environment as a result of the atmospheric testing of nuclear weapons. Over the succeeding 43 years there has been a cessation of atmospheric testing of weapons, although underground testing has continued. Man-made radionuclides continue to be released into the

environment, from the large growth of a civil nuclear power programme and the use of radionuclides in medicine, agriculture and industry. There is also an increase in exposures of patients because of increasing access to medical procedures and to new techniques such as computed tomography and interventional radiology. People are exposed by their work in industry and health care and subject to elevated radiation levels by air travel. There has at the same time been a growing realization of the extent to which mankind is exposed to natural sources of ionizing radiation.

5. The Committee is now the major international body to review the exposure of the world population to all sources – natural and artificial, domestic and occupational – and under normal circumstances as well as after accidents, such as that at Chernobyl in 1986. The levels of exposure from all of these sources change with time and vary in different parts of the world, which requires their frequent re-evaluation by the Committee.

6. All people are exposed to radiation of natural origin, the levels of which vary greatly from place to place but remain relatively constant over time. By comparison, atmospheric testing of nuclear weapons caused a significant increase, equivalent to about 10 per cent of average natural background exposure to most of the global population in 1963, but the level of radiation has declined markedly with time. The Chernobyl accident caused extremely high doses to some individuals in the short term and lengthy moderate exposures to large population groups. Its global impact was relatively small in dose terms, being about 2 per cent of average natural background exposure in the first year and declining significantly in the subsequent 12 years. Nuclear power production has increased from zero at the time of the 1955 resolution to a level of some 20 per cent of the world's electrical energy supply today, with small but increasing doses to the population. However, it is medical exposures that give rise to the largest contribution from man-made sources. Those doses vary between different regions of the world having different levels of health care and there is also a wide range of diagnostic and therapeutic doses that can be received during a particular treatment.

7. The substantive reports of the Committee to the General Assembly, rather than the annual progress reports of the Committee, have reviewed the changing levels of dose from all the sources of exposure and have thereby informed the Assembly of their trends, both increasing and decreasing.

8. Since the adoption of resolution 913 (X) in 1955, it has become apparent that the primary late effect of exposure of a population to ionizing radiation is the probability of the development of an excess of cancers many years after that exposure. Epidemiological, experimental and molecular biology studies on radiation effects have revealed new facts, which have led to significant increases in the risk estimates over time. That conclusion has been derived from the survivors of the atomic bombings at Hiroshima and Nagasaki – the primary source of information on human impact – as well as from a number of other groups irradiated for medical diagnostic or therapeutic reasons and some who were occupationally exposed, for example, underground miners exposed to radon. The Committee regularly scrutinizes the available data, including especially the Japanese survivor data, to assess the cancer risk estimates. It also reviews the evidence for harmful effects in future generations.

9. The Committee has become the primary international scientific body reviewing and assessing the health risks of exposure to ionizing radiation. Its estimates have been, and are still being, used by major international bodies including the International Commission on Radiological Protection and United Nations agencies such as the International Atomic Energy Agency, the World Health Organization, the International Labour Organization and the Food and Agriculture Organization of the United Nations, as well as the Nuclear Energy Agency of the Organisation for Economic Cooperation and Development.

10. Most national authorities cite the United Nations Scientific Committee on the Effects of Atomic Radiation as the definitive authority, giving a balanced view on levels of exposure and the health effects of those exposures. That reputation has only been earned because of the excellence and independence of its reports. In addition, documents of the Committee guide the direction of research in the field of radiological protection and thus encourage research activities throughout the world. In its most recent report, the Committee reviewed the effects of radiation on the environment.

11. The method of working of the Committee is by representatives and their advisers scrutinizing, at each annual meeting, texts on the topics identified as important by the Committee that have been prepared by the Secretariat. The participants at Committee meetings are the 21 representatives of the member States and their advisers, who number between 60 and 70 and whose attendance is paid for principally by national authorities (the United Nations provides travel funds only for the representatives). This can be seen to reflect the importance attached to the meetings and the documents produced. The topics to be addressed are those identified by the Committee and endorsed by the annual resolutions of the General Assembly.

Chapter III

Interactions with other United Nations agencies

12. Both WHO and IAEA send observers to attend the sessions of the Committee, so that there is close collaboration throughout the development of the reports. There is also close collaboration when particular issues must be addressed, such as the review of the Chernobyl reactor accident and of the nuclear test site at Mururoa and Fangataufa in the South Pacific. The International Commission on Radiological Protection and the International Commission on Radiation Units and Measurements are also represented at sessions of the Committee.

13. Therefore, the Committee does not see the need for pre-publication evaluation by the International Atomic Energy Agency or the World Health Organization, since such evaluation could be seen as adversely influencing the independent perspective that is essential for the credibility and objectivity of its scientific reports. Indeed, the scientific independence of the Committee can be seen as strengthening the United Nations system by the input of its scientific expertise.

Chapter IV

The present and future programme

14. Because of the questions that have arisen concerning both the local and regional exposures from the Chernobyl accident in 1986 and the reported high incidence of thyroid cancer in those exposed as children, the Committee has decided that it should produce a review of all the information available some 12 to 14 years after the accident. This would form a major component of the year 2000 report of the Committee.

15. The assessment of risks to human health derived from Chernobyl exposures will serve to complement the estimates that are made from the survivors of the atomic bombings of Hiroshima and Nagasaki in 1945. At the most recent 1990 evaluation of mortality in those survivors, nearly 50 per cent of those exposed in 1945 were still alive. The Committee intends to continue to assess the cancer mortality and incidence data and to validate the risk estimates derived with those from studies of medically or occupationally exposed groups.

16. There is continuing concern over the possibility of harm in the progeny of exposed persons (hereditary effects). The Committee is reviewing all of the data that are available, including those from human populations, to establish the degree of risk. The cellular changes that determine heritable genetic defects and which are also thought to be important in cancer induction are related to the alteration and loss of genetic information by damage to the deoxyribonucleic acid (DNA) in human cells by radiation. The Committee is therefore studying those mechanisms by reviewing developments from experiments that apply the techniques of molecular biology.

17. As indicated in paragraph 6, the world population is exposed to radiation from a number of sources, the principal ones of which are naturally occurring. The largest source of natural exposure is from radon, a gas that diffuses from the ground and is accumulated in buildings. The radon concentration in buildings varies by a factor of several thousand between different locations and circumstances. The Committee is compiling the information becoming available from many countries to assess both the levels of exposure and the associated risks.

18. Artificial radionuclides in the environment arise from civil and military nuclear programmes and from the use of radiopharmaceuticals in medicine. The Committee provides a continuing evaluation of the transfer of radionuclides through the environment to the world population. In the future there will be decommissioning of many facilities – power plants and defence installations – that will lead to disposals of radioactive wastes and residues and the release of previously contaminated land. The Committee is ideally placed to keep under review the resulting exposures of the population.

19. Medical irradiation is the largest source of man-made exposure of the population. Over the last 100 years, it has become an essential tool for diagnosis and therapy, but there remains a far from equitable distribution of medical radiation services between different countries. The Committee comments on the global trend in diagnostic X-ray examinations and the use of radiopharmaceuticals, assesses global practices in radiotherapy and draws attention to accidents with medical sources.

Chapter V

Summary and recommendation to the General Assembly

20. The Committee's reports have an unrivalled reputation for independence and excellence and are quoted as the objective and definitive international scientific position. The

Committee intends to produce not only a year 2000 report, but continuing reports, the scope of which will be comprehensive assessments of the levels of exposure to which the world population is exposed and a continuing re-evaluation of current knowledge on the effects of ionizing radiation. Those publications will continue to be the basis on which international and national agencies will develop further appropriate protection standards for workers, patients and the general public.

21. On the basis of the present summary of the Committee's past and present programmes, the Committee recommends that the General Assembly maintain the present functions and role of the Committee, including the present reporting arrangements.

Notes

[1] The United Nations Scientific Committee on the Effects of Atomic Radiation was established by the General Assembly at its tenth session, in 1955. Its terms of reference are set out in Assembly resolution 913 (X) of 3 December 1955. The Committee was originally composed of the following Member States: Argentina, Australia, Belgium, Brazil, Canada, Czechoslovakia, Egypt, France, India, Japan, Mexico, Sweden, Union of Soviet Socialist Republics, United Kingdom of Great Britain and Northern Ireland and United States of America. The membership of the Committee was subsequently enlarged by the General Assembly in its resolution 3154 C (XXVIII) of 14 December 1973 to include the Federal Republic of Germany, Indonesia, Peru, Poland and the Sudan. By its resolution 41/62 B of 3 December 1986, the Assembly increased the membership of the Committee to a maximum of 21 and invited China to become a member.

[2] For the previous substantive reports of the United Nations Scientific Committee on the Effects of Atomic Radiation to the General Assembly, see *Official Records of the General Assembly, Thirteenth Session, Supplement No. 17* (A/3838); ibid., *Seventeenth Session, Supplement No. 16* (A/5216); ibid., *Nineteenth Session, Supplement No. 14* (A/5814), ibid., *Twenty-first Session, Supplement No. 14* (A/6314 and Corr.1); ibid., *Twenty-fourth Session, Supplement No. 13* (A/7613 and Corr.1); ibid., *Twenty-seventh Session, Supplement No. 25* (A/8725 and Corr.1); ibid., *Thirty-second Session, Supplement No. 40* (A/32/40); ibid., *Thirty-seventh Session, Supplement No. 45* (A/37/45); ibid., *Forty-first Session, Supplement No. 16* (A/41/16); ibid., *Forty-third Session, Supplement No.45* (A/43/45); and ibid., *Forty-eighth Session, Supplement No. 46* (A/48/46). These documents are referred to as the 1958, 1962, 1964, 1966, 1969, 1972, 1977, 1982, 1986, 1988 and 1993 reports, respectively. The 1972 report with scientific annexes was published as *Ionizing Radiation: Levels and Effects, Volume I: Levels* and *Volume II: Effects* (United Nations publications, Sales Nos. E.72.IX.17 and 18). The 1977 report with scientific annexes was published as *Sources and Effects of Ionizing Radiation* (United Nations publication, Sales No. E.77.IX.1). The 1982 report with scientific annexes was published as *Ionizing Radiation: Sources and Biological Effects* (United Nations publication, Sales No. E.82.IX.8). The 1986 report with scientific annexes was published as *Genetic and Somatic Effects of Ionizing Radiation* (United Nations publication, Sales No. E.86.IX.9). The 1988 report with annexes was published as *Sources, Effects and Risks of Ionizing Radiation* (United Nations publication, Sales No. E.88.IX.7). The 1993 report with scientific annexes was published as *Sources and Effects of Ionizing Radiation* (United Nations publication, Sales No. E.94.IX.2). The 1994 and 1996 reports with scientific annexes were published as *Sources and Effects of Ionizing Radiation* (United Nations publications, Sales Nos. E.94.IX.11 and E.96 IX.3, respectively).

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